Draft Minutes - ASRG meeting 22-24 February 2021

Day 1: Monday, 22 February 2021

Attendees

(note - list may not be complete as people dropped in and out of the teleconference)
- SRG members: Genny Nesslage, Richard Merrick, Bob Kenney, Buddy Powell, Erin Summers, Kathryn Ono, Ana Sirovic, Yong Chen, Michael Moore, Jack Lawson, Andy Read
- USFWS: Teresa Calleson, Scott Calleson, Ashley Stilson, David Caldwell
- MMC: Sam Simmons, Dee Allen, Dennis Heinemann, Erin LaBreque
- NMFS: Sean Hayes, Beth Josephson, Shannon Bettridge, Zac Schakner, Debi Palka, Laura Engleby, Danielle Cholewiak, Annie Gorgone, Jen Higgins, Kimberly Murray, Lance Garrison, Laura Ingulsrud, Michael Asaro, Melissa Soldevilla, Patty Rosel, Patrick Lynch, Stacey Horstman, Eric Patterson, Mridula Srinivasan, Kathy Foley, Lisa Lierheimer, Jessica Powell, Jenny Litz, Deborah Fauquier, Caroline Good, Barb Zoodsma, Allison Rosner, Erin Fourgeres, Richard Pace, Lisa Conger, Tim Cole, Fred Wenzel, Kim Tripp, Kristy Long, Keith Mullin, Laura Dias, Teri Rowles, Chris Orphanides, Peter Duley, Elizabeth Featherstone, Jim Caretta, Lynne Hodge, Lynsey Wilcox, Nicole Vollmer, Genevieve Davis, Andrea Chan, Kristin Precoda, Marisa Trego, Robert Martin, Eric Matzen, Brian Galvez, Jennifer Wallace-Turek, Colleen Coogan, Diane Borggaard
- Others: Patrice McGarron (Maine Lobstermen's Assoc.), Paula Moreno (IAT), Doug Demaster (IAT)

Welcome and introductions (SRG - Genny Nesslage)

Everybody is welcomed and the ASRG members are introduced. Hayes introduced headquarters and regional office staff in attendance, as well as the contingent from USFWS.

Nesslage asked if anyone had changes or suggestions for the agenda. Hearing nothing, she moved to adopt the agenda. She presented slides that summarized the SRG recommendations and NMFS responses from last year. The most important of these were:

- Point 1 : North Atlantic right whale and humpback cryptic mortality – The right whale cryptic mortality has been published, but the equivalent for humpbacks is still not available. Hayes explained that this will be discussed in detail later, but since the supporting paper has not been published, NMFS will hold back the humpback SAR. An

additional comment under this heading was some concern by the SRG that entanglements that would have been serious injuries prior to disentanglement are not counted against PBR. The NMFS response, which Patterson reiterated, is that PBR counts actual removals from the population, and there are others means that serious injuries prevented by intervention are accounted for, including TRTs and the List of Fisheries.
- Point 4: Document humpback whale model – The recommendation letter made it clear that the SRG supports continuing to report the CMR estimates alongside the line transect estimate. Hayes said the manuscript supporting this methodology is in prep.
- Point 5: DHW mortality estimates
- Point 6: Revise/formalize peer review process. Merrick wondered if HQ has had issues with peer review in other regions. Bettridge and Schakner both said no.
- Point 7: Stock structure of bottlenose dolphins – NMFS is committed to convening a meeting and has received funds to study stock structure. The SEFSC will report more on this during their center updates.
- Point 10: Kogia ID – After some discussion, it was concluded that not reporting most Kogia sightings to species is standard. The centers agreed to increasing training and to sharing and rotating observers among centers.

The SRG had also written a letter to the USFWS. Scott Calleson said USFWS will address the SRG comments and status of manatee SARs in their presentation. Theresa Calleson said they restructured the SAR based on SRG comments. With regard to the Warm Water Habitat Action Plan, though it was finalized in Nov 2020, it is considered to be adaptable. USFWS can submit that to the ASRG and the welcome input. T. Calleson pointed out that they are scheduled for a meeting with the Florida Power and Light in April 2022, about rollout to the power industry.

National Updates

Leadership Changes (NMFS - Shannon Bettridge) – Bettridge presented an organization chart. There is a new Secretary of Commerce and new head of NOAA. Chris Oliver was a political appointee and has stepped down. Paul Doremus is acting. Cisco Werner and Sam Rauch are still in place. Evan Howell is director of S&T.

Membership Review Summary (NMFS - Zac Schakner) – Schakner said there had been no openings or new appointments of the SRG membership this year, though Yong Chen had deferred from last year so this is his first year.

Terms of Reference Revisions – The SRG terms of reference are scheduled to be revised every 5 years. This was the first round of revisions. NMFS reached out to SRGs for ideas for changes. One proposed change is increasing the tenure from 3 to 4 years. Another change requested was to have a 3-month timeline for recommendations. A third change proposed is to allow former NOAA or FWS employees to sit on the SRG after they have been out of NOAA or FWS for 1 year. NMFS appreciates input on all proposed revisions.

MMPA 101(a)(5)(e): Criteria for Negligible Impact Determinations (NID) and Proposed Authorizations (NMFS - Eric Patterson) - Patterson explained that this is the authorization of incidental take of ESA listed marine mammals in commercial fisheries. There are files in the documents folder explaining this further. NMFS started with the Gulf of Mexico longline fishery and is continuing to authorize other fisheries.

Status of 2020 Draft SARs (NMFS - Zac Schakner) - Schakner explained that the 2020 SARs are out for public comment now until early March. NMFS will also respond to SRG intersessional review recommendations before publishing finals. Merrick suggested NOAA might consider a fall SRG meeting so the SRG can comment before the docs go out for public comment. Schakner said in an effort to get the the Gulf SARs out with the rest, we did a concurrent review with the SRG, and this may not be the best route moving forward.

UME Updates - (NMFS - Deborah Faquier) - Faquier presented a summary of unusual mortality events in the past year. There have been 70 UMEs declared since 1991.

There are 6 UMEs actively under investigation:
1. 2015-2021 Guadalupe Fur Seals along the West Coast (WA-CA) (Cause: Suspect Environmental Factors-Prey-related)
2. 2016-2021 Humpback Whales in the Atlantic (Cause: Suspect Human Interaction)
3. 2017-2021 North Atlantic Right Whales in the Atlantic (Cause: Human Interaction)
4. 2017-2021 Minke Whales in the Atlantic (Cause: Suspect Human Interaction/Infectious Disease)
5. 2019-2021 Gray Whales along the West Coast (Cause: Undetermined)
6. 2018-2021 Alaska Ice Seals (Cause: Undetermined)

There are 3 UMEs soon to be closed:
1. 2013-2019 Manatees in Indian River Lagoon Florida (Cause: Suspect Environmental Factors-Prey- related)
2. 2018-2019 Bottlenose Dolphins in SW Florida (Cause: Biotoxin)
3. 2018-2019 Pinnipeds in Northeast US (ME-VA) (Cause: Infectious Disease)

Key facts about the 2017-2021 North Atlantic Right Whale UME include:
- Location: Canada to Florida
- Timeframe: Jan 2017 to Present Numbers: 48 whales
- 33 Carcasses (21 Canada; 12 US)
- 15 Serious Injury (4 Canada; 11 US)
- Preliminary Cause: Human Interaction
- Significant Findings: 23 (~70%) of the carcasses have been examined (necropsy or photo documentation); 19 were Human Interaction (8 EN; 11 VS); there were 15 live seriously injured whales (13 EN; 2 VS)

Key facts about the 2016-2021 Atlantic Humpback Whale UME include:
- Location: Maine to Florida

- Timeframe: January 2016 to Present
- Numbers: 147 whales
- Preliminary Cause: Suspect Human Interaction
- Significant Findings: Approximately 100 whales were examined (necropsy or photo documentation) and 28 were found to be human interaction (8 EN; 20 VS).

Key facts about the 2017-2021 Atlantic Minke Whale UME include:
- Location: Maine to Florida (SC)
- Timeframe: January 2017 to Present
- Numbers: 105 whales
- Preliminary Cause: Suspect Human Interaction & Infection
- Significant Findings: Approximately 81 whales were examined (necropsy or photo documentation) and 25 were found to be human interaction (22 EN; 3 VS). 24 whales were suspected to have died from infectious disease.

Nesslage asked what it would take for food source problems to be included in a UME; is there any evidence of malnutrition? Faquier said the primary driver for the right whale UME is human interaction. The carcasses that have been examined were not emaciated.

Southeast Regional Office Updates (NMFS - Laura Engleby)

Bottlenose Dolphin Take Reduction Plan (BDTRP) – Engleby reported that analyses of BDTRT's regulatory gillnet recommendations for the NC Northern & Southern estuarine stocks have been completed. NMFS has been collaborating to implement the ASRG's 2019 and 2020 recommendations related to the NC estuarine stocks including coordinating with the SEFSC and with external and internal research partners. The immediate next steps are to pull together a meeting with Kim Urian, Andy Read, and Randy Wells and to plan for convening the BDTRT.

Pelagic Longline Take Reduction Plan (PLTRP) – Engleby said the good news is NMFS was able to get the proposed rule to amend the PLTRP and implement consensus recommendations published on 14 December 2020. The rule proposes to: 1) Remove the Cape Hatteras Special Research Area and its special observer and research participation requirements; 2) Modify mainline length restrictions in the MAB; 3) Implement terminal gear requirements for the EEZ portion of the FEC, SAB, MAB, and NEC fishing areas with the goal of making the hooks the weakest part of the terminal gear; and 4) Remove Risso's dolphins and long-finned pilot whales from consideration under the Plan (short-finned pilot whales remain). Public comment period closed on 16 February 2021 (16 comments were received).

Aquaculture Opportunity Areas (AOAs) in the Gulf of Mexico – Engleby said an emerging issue for NMFS is aquaculture. An Executive Order was signed by the previous administration to streamline and increase aquaculture within federal waters. One area that was chosen was in the Gulf of Mexico and the other was on the West Coast. The Office of Aquaculture (OAQ) and NCCOS have led a spatial modelling exercise to identify areas of impact and OAO & PR have formed working groups to discuss development of monitoring design, best management practices, risk assessment, gear characterization, and farm siting analysis.

Southeast Region Strandings - Engleby said this year was a little below their annual stranding average of 835 animals.

Hurricane Rescues 2020 - One thing of note is it was a very active hurricane season for the northern Gulf of Mexico. There were many reports of out of habitat dolphins. Six were rescued in western LA and relocated to open water; 1 dolphin is still pending rescue (near Myrtle Grove, LA).

DWH/NRDA Open Ocean Projects - Engleby said her main message is that we have moved to full blown implementation now. NOAA led projects that are currently being implemented include:
- Reducing impacts of anthropogenic noise
- Reducing impacts to cetaceans during disasters by improving response activities
- CETACEAN database platform - combine health, population, threat, other data in one place
- Reduce and mitigate vessel strike mortality
- PCoMS model (Population Consequences of Multiple Disturbances)

DWH/NRDA Restoration Updates
- AL photo-ID and health assessment (ongoing)
- Florida restoration plan was just released on February 19th
- LA MMSN project was just funded - about $3 million to setup a marine mammal stranding network in LA
- MS restoration plan expected to include MM projects - expected in the next year or so
- Region wide projects will be released to the public soon - region-wide funding for projects across the northern Gulf area

Right Whales - Engleby said the good news is there were 15 mother/calf pairs in the SE; the bad news is a mortality of a calf (named Infinity). On February 12, there was a report of a vessel strike. On February 13, there was a report of a stranded whale. Infinity presented with lesions of propeller marks shortly thereafter. Another situation shared was a sighting of Cottontail on February 18. Cottontail was first observed entangled in Nantucket in October 2020. The animal was observed in February of 2021 incredibly emaciated. Unfortunately, weather conditions pre-empted a response and there have been no additional sightings of Cottontail.

Gulf of Mexico Bryde's Whales (Rice's Whales) - Engleby said Barb Zoodsma is the SER large whale coordinator. NMFS has completed a recovery outline that is available online and is planning recovery workshops for this next year. A contractor has been hired to work on Critical Habitat determination. The Rosel et al. paper has been submitted to the Society for Marine Mammalogy taxonomy committee for consideration. Once that step occurs, NMFS will move submit a technical amendment under the ESA to change the name. Until that time NMFS will continue to refer to the species as Gulf of Mexico's Bryde's whales.

Merrick asked NMFS to keep the SRG updated on what's happening with aquaculture, which is an important issue with significant conservation impacts. It would be useful to know what happens as things develop. Engleby replied NMFS will definitely keep the SRG updated.

Read asked what is involved with the TRT regulatory recommendations. Horstman said they're working with Lyssikatos at NEFSC. Lyssikatos is looking at modeling and analyses with observer data and is working closely on economic impact aspects. Read asked if that would be presented at the TRT meeting. Horstman answered that she plans to present all that information.

Read asked if there was any consideration of expanding right whale vessel speed protection zones in the SE. Engleby replied that NMFS released a report of the ship speed rule which includes recommendations for how NMFS might strengthen the rule. We are looking at that and taking comments right now. In terms of the critical habitat, we are looking at things coast-wide.

Moore asked Bettridge if there was any way that NMFS could act in a more expeditious manner to enact and enforce speed reduction zones for right whales. Now is the time to act rather than report and think. Bettridge said NMFS is asking all mariners to slow down. Even emergency measures take time to get through the bureaucracy. NMFS is publishing as much outreach as we can. Engleby said SER asked the state of Florida if there was anything they could implement quickly, and there was not. Moore mentioned what Massachusetts has been doing in Cape Cod Bay seems to be working. Englbey noted FL has tools to slow vessels for manatees only.

Merrick had the same point, wondering if DMAs are only applicable in the NE. Engleby replied that the SE issues DMAs as well. Zoodsma said in the case of the recent shipstike the sightings were within the existing seasonal management area (SMA). The SMAs in the southeast are much larger than the ones in the NE so there aren't nearly as many DMAs. The region implemented 2 or 3 of them from North Carolina southward this year. Moore said that Massachusetts went to applying speed rules to all vessels, and it is critical to cover all vessels given the amount of recreational traffic there is in the calving area. Zoodsma said that is what they have been talking to the State of Florida about. The response to the calf in 2004 that was incidentally caught in gillnets took a year. Merrick said this may be something relevant for the ASRG to comment on. There's a need for a tool to deal with vessels under 65 ft. Moore added that the risk to humans involved in a whale strike increases as the boat gets smaller.

Cetacean Trend Analysis (NMFS - Debi Palka)

Palka presented her draft results of state-space modeling of cetacean summer abundance trends during 1992-2016. The goals were to not only look at trends to fulfil SAR requirements, but also to look at trends in the changes of distribution and abundance due to changes in climatatic and other factors. The method used was multivariate autoregressive state-space model (MARSS) techniques applied to the abundance estimates reported in previous SARS that were standardized to the US waters and were appropriately corrected for perception and availability biases. This method allows covariates (such as climatic variables) to affect either or both the state process or the observational process. At this time, Palka was just considering

covariates that affect the true underlying state process. The future plan is to ensure all the previous data are standardized and to include the abundance estimates resulting for the upcoming summer 2021 abundance surveys.

The ASRG provided comments and suggestions on this preliminary analysis. It was suggested to consider lagging the covariates to investigate if previous conditions better predict the distribution and abundance patterns. It was also suggested that when possible to include data collected just outside the US study area since it is well known many of these species move freely between US and Canadian waters. It was also suggested to consider exploring models that allow for non-stationarity, so that the rate of change might change over time. The ASRG also noted that since these models allow for both state and observational error, it would be useful to consider candidate models that allow covariates to affect the observational process, in addition to the state space. It was also suggested that other measures of goodness of fit be explored, such as cross-validation within the observed data or testing the robustness of the model by predicting the distribution and abundance of a year outside of that used to create the model. It was suggested to explore fish distribution patterns as other potential covariates. In addition, the ASRG suggested collaborations with NEFSC fish stock assessment scientists interested in similar questions would benefit both teams of scientists. Palka welcomed these comments as they would help in developing the final analysis. Finally the ASRG thanked Palka for the presentation and looked forward to seeing the completed analysis.

Science Center Updates

SEFSC Updates

Division Structural/Staff Changes (NMFS - Mridula Srinivasan) – Srinivasan presented SEFSC organizational changes. The Marine Mammal and Sea Turtle Division has been centralized (i.e., not one at each satellite lab). Srinivasan is the new director of this MMTD division and there will be two Branch Chiefs, one for Turtles and one for Marine Mammals. The biodiversity program is still temporarily within MMTD division. Nesslage asked when the reorganization is expected to be complete. Srinivasan replied that it is expected to be complete by the end of the fiscal year or December 2021 at the latest.

GoMMAPPS (NMFS - Jenny Litz) – Litz outlined the surveys conducted. She explained that there are new models to be used and the new data to be inputted. GoMAPPS is searching for more funding for another year. Read expressed surprise that there are no definite broadscale survey plans on the horizon. Litz and Garrison said they are trying to find ways to fund these and are talking to multiple partners. Read said it used to be the case that NMFS had base funding to meet the requirements of the MMPA; is that no longer the case? Garrison replied that NMFS provides vessel time, but not necessarily money to do the science required on these vessels and analysis afterwards. The centers have always relied on external funding to make these happen.

Gulf of Mexico Bryde's Whale Passive Acoustic Monitoring (NMFS - Melissa Soldevilla) – Soldevilla updated the group on recent passive acoustic Gulf of Mexico Bryde's whale work. Many different sources of funding are being used to try to see why these whales are where they are. They have been looking at the long moan calls. There is also a focus on the western Gulf of Mexico and they are starting to look into deeper waters. Several bottom mounted recorders have been deployed and several others were delayed due to COVID constraints.

Merrick asked what the difference is between a sound trap and a HARP. Soldevilla said sound traps sample up to 24kHz for 6 months at a time. HARPs can go out for ~2yrs and have much greater frequency range. The bigger frequency range is not needed for large whales. Sound traps are less expensive units, so a broader area can be monitored.

RESTORE Science Program Gulf of Mexico Bryde's Whale Trophic Ecology (NMFS - Lance Garrison) – Garrison outlined recent work toward understanding Bryde's whale trophic ecology in the 3rd year of a 3 year project. The project included 3 vessel cruises and trawling for fish samples. The research is looking into whether there are other places in the Gulf of Mexico that provide similar habitat. Using suction cup tag data, people are looking at feeding and dive data and breath rates. Active acoustic data are being used to figure out where certain prey are. Patches of prey seem to be around the 200m isobath which is where the whales prefer to be. About 30 individual Bryde's whales have been identified by photo-ID. Drone photogrammetry has been done on some whales looking at length:girth ratios, etc. There are other reports and workshops coming over the next few months.

Lawson asked if the fish are myctophids. Garrison said they look like it, but they aren't. They are related to hatchet fish. The samples are being run this week. The trawl was run through big aggregations of these fish and they collected bushels of them. They are "little balls of energy."

RESTORE Science with Passive Acoustics (NMFS - Melissa Soldevilla) – Soldevilla discussed current US and Mexican long term monitoring for cetaceans. These sites are in deeper waters. There are 21 cetacean species in the Gulf of Mexico; 7-10 of them can be acoustically identified, which is what they are focusing on. A small amount of fieldwork in August 2020 deployed PAM units. Density, signal detection, habitat modeling, and other analyses were done on these data. There were no questions from the SRG.

Alabama Common Bottlenose Restoration Project (NMFS - Keith Mullin) – Mullin presented updates on this ongoing project which is collecting data from 2019-2023. In the past year some surveys were able to run, and some surveys were cancelled due to COVID. One dolphin was biopsied and was later found dead. The biopsy dart hit the dorsal fin, not the normal target area, and got infected. A second dolphin that had not been biopsied was found dead two weeks later suggesting the infectious agent was in the water. A paper is coming out on this. This incident has changed the permitting process for all who are wanting to do biopsies.

CETACEAN Overview (NMFS - Jenny Litz) - Litz presented on the 5-year NOAA-implemented project to put a platform together to bring many data sets into one collaborative place. This project is just starting. The SRG had no questions.

Population Consequences of Multiple Stressors: Sperm Whales and Oceanic Dolphins (NMFS - Lance Garrison) – Garrison summarized the phases of this two phase project which focuses on the impacts of multiple stressors on sperm whales and oceanic dolphins. Stressors include impacts from other Restoration projects, vessel strikes, seismic disturbance, chronic oceanic noise, oil exposure, and prey variability. Draft models will come out in 2021. Fieldwork will be in 2022 and 2023 to collect data to model gpas and address key uncertainties in the models.

Mid-Barataria Sediment Diversion (NMFS - Lance Garrison) – Garrison updated the group on the status of this project which is using sediment to combat large scale marsh loss as part of the Louisiana Mater Plan. The concern is when large amounts of freshwater are diverted into the estuary there may be impacts on bottlenose dolphin survival. The biggest impacts will be in the areas further into the bay, and smaller impacts are expected out towards the islands. Conclusion: If freshwater is diverted, it would have a major impact (34% decline in annual survival rates) on the bottlenose dolphins in this area. Draft will be out in mid-March.

Wells asked if there might be a difference in this plan due to a change in administration. Garrison said this was a legislative act under the 2018 budget act by Congress, so no. They essentially got a waiver of MMPA regulations, so they don't have to go through MMPA permitting, but still have to do NEPA permitting.

Sperm Whale Photo-ID Catalog (NMFS - Keith Mullin) - Mullin explained that BOEM is funding a project through Oregon State University on DNA/Genomics/Photo-ID for sperm whales in the Gulf of Mexico. Flukebook will serve as a platform for integration.

Plans for 2021 (NMFS - Keith Mullin) - Mullin outlined 5 different main efforts for SEFSC fieldwork including: 1) Continuation of Alabama bottlenose dolphin research in summer and winter; 2) a summer AMAPPS ship survey; 3) a summer AMAPPS aerial survey; 4) Rice's (Gulf of Mexico Bryde's) whale research in September; and 5) PAM mooring deployments.

Moore asked if the tagging work planned would be only suction cup tags on Gulf of Mexico Bryde's whales. Mullin said NMFS is not supportive of invasive tags on these animals. Probably

the only circumstance to deploy a LIMPET style tag would be if we would encounter a whale way out west that looked really healthy.

NEFSC Updates

Passive Acoustics (NMFS - Genevieve Davis) - Davis presented updates on current passive acoustic deployments and research. Contributions toward North Atlantic Right Whale projects include year-round monitoring with fixed buoys and real-time gliders. Nine slow zones have been triggered due to acoustic detections. An interactive Passive Acoustic Cetacean Map is nearly completed and will go live in March 2021. The group has been involved with national soundscape monitoring since 2014 with the NOAA Ocean Noise Reference Station Network. The SanctSound project has been recording sounds in 7 sanctuaries and 1 national monument since 2018. Soundscape monitoring is now also being applied in Australia Marine Parks, with methods developed there being used to set up monitoring off the US waters.

Merrick asked if the moored buoys on the LNG network were still operational. Davis said they are, but she didn't include those because NMFS doesn't monitor them.

AMAPPS (NMFS - Debi Palka) - (actually presented in morning) Palka presented updates on progress with the Atlantic Marine Assessment Program for Protected Species (AMAPPS).

Lawson asked Palka if she would be trying digital geometers during this year's survey. She replied she plans to, if she can get the software to work. Lawson said DFO developed new software that they would be willing to share. It has made a huge difference. Palka said she would be happy to test it out. Garrison asked that Tony Martinez be looped into that conversation.

Sirovic asked if the passive acoustic collection on the survey would continue to focus on towed arrays. Palka said yes, the towed array surveys are the only passive acoustics projects funded under the AMAPPS program.

Merrick asked about funding security for the future. Palka replied that the program extends through 2023, but beyond that is unsure. Merrick wondered if the AMAPPS project covered offshore wind development in the Gulf of Maine. Hayes said we will present more on wind projects later, but AMAPPS data will be used as a baseline for the Gulf of Maine.

Seal Research (NMFS - Kimberly Murray) - Murray provided a short update on current seal research, focusing on the high levels of gray seal bycatch in the New England sink gillnet fishery. Total estimated bycatch in 2019 was over 2,000 animals, which exceeded PBR levels (however the 5 year average currently remains below PBR). This equates to roughly 1 seal every 4 hours. Observer data from 2019 will likely inform conditions in 2020 and possibly 2021 because observer coverage has been very limited due to COVID restrictions. The large mesh fleet out of Chatham is catching a lot of gray seals. She briefly presented results from a manuscript in review that identifies areas of encounter risk between gray seals and large mesh

gillnet fishing effort using gray seal satellite telemetry data, which highlighted high encounter risk east and southeast of Chatham in spring and summer. A gray seal pupping survey was completed for all pupping areas in US and Canada in January 2021 which will provide updated estimates of gray seal abundance.

Read asked what the target species is for the large mesh size net, and Murray replied it is mainly monkfish, dogfish, and skate. Moore asked about the status of the observer program. Murray replied that the observer program has been limited. Very few days were achieved in 2020 and that might continue into 2021. The bycatch estimates in the SARS are based on rates derived from dead animals. Since these do not include animals that break through the net and live with entanglements, we are likely underestimating the true amount of bycatch (this uncertainty is noted in the SAR). We need a way to document and enumerate live, uniquely-identified entangled animals so these can be added to the bycatch estimates.

Hayes said that the gray seal population is rapidly growing, but we are also at PBR. This is a tough policy concept that no one has wrapped their head around. NEFSC would be open to ASRG guidance on that. We are working towards understanding the social science perspective of this. Merrick reminded folks that this is a transboundary stock, and the stock size and PBR need to be parsed out, whether it's US/Canada (or US/Mexico for other species). Murray said that one goal of the tagging work was to look at the amount of time the animals were spending in US and Canadian waters, because time spent in respective countries was recommended in the GAMMS as one way to parse out PBR. They got some information from the 30 animals tagged in 2019 and 2020, albeit it was just for the young of the year age class. Averaged over all individuals, the seals spent roughly 8% of their time in Canadian waters, but 1 individual spent roughly 50% of his time. So, one could use those statistics to inform PBR but more data are needed on other age classes. Alternatively, one could use the amount of stock produced in US waters, which was 6% based on den Heyer et al. 2020. The problem is that we don't have good data on bycatch in Canadian waters. Merrick agreed that animal movements by age are very different. Read said that we never imagined that we would have a recovering population when the source is in an adjacent country. But others stated it's not a source/sink issue. Instead, it is one population, split by the boundary between the US and Canada. We would need a PBR for both the US and Canada combined (one PBR shared between the two countries). The US would be below the limit. Animals would recolonize areas from which they were extirpated. The population is not declining, it is still recolonizing. We need an assessment across the boundaries. Ono asked if most of the bycatch are young animals. Murray said yes, based on the majority of sizes documented by observers. We see larger animals living with entanglements, though, so it could be that only the small ones get up on deck, and the older ones drop out or break through the gear. Ono asked if it is likely the pups from the US are getting caught in US waters. Murray said "maybe," but we know from tagging that young animals disperse widely and into Canada after leaving the US colonies. Wenzel also pointed out that years ago pups branded on Sable were bycaught in US gillnets, and we've seen our tagged animals in the bycatch, so there appears to be mixing in the bycatch. Doug Demaster said the SCEMFIS study calculated a PBR several ways: for animals in US waters, for those in US/SW Nova Scotia waters, and for those in US/SW Nova Scotia/Sable Island waters. This will be

discussed further on Wednesday. Lawson asked what is the take rate of gray seals due to sharks in this area. Murray said she does not know, but has seen lots of animals that have survived shark attacks. Merrick said it seems we are over or near the PBR for US waters, but it would be well below stock PBR. If we exceed PBR in US waters, but not over the entire stock PBR, what to do? Would we organize a TRT, especially when some have the perspective of there being way too many gray seals?

Wind Projects (NMFS - Chris Orphanides) - Orphanides presented updates on NEFSC's involvement with wind energy projects. Sixteen lease areas are potentially authorized for wind development. A lot of these areas are off MA-RI and would be some of the first to be constructed, with about 2,000 turbines planned for that area. There is also a potential for floating offshore wind in the Gulf of Maine. A 10 MW demonstration project is planned for 2023, with a research array of 12 or fewer turbines planned for as early as 2025. The NEFSC currently has no permanent funds to address offshore wind concerns. Temporary funding has been provided annually, with one protected species staff member devoted to wind at half-time and others contributing as needed. Primary concerns with regards to protected species include the impacts of both construction and operation. With regards to construction, concerns include potential displacement and harm from increased noise and potential increases in vessel strikes from increased ship traffic. With regards to operational impacts, concerns include displacement, entanglement in ghost gear, vessel strikes, a reef effect, and oceanographic changes. A large unknown involves potential oceanographic impacts that may impact the distribution of prey resources by extracting large amounts of energy from the system, which could in turn affect mixing and currents in the region. Currently the Protected Species Branch (PSB) is reviewing regulatory documents, providing input to guide various research and funding efforts, collaborating with cooperating institutions on research, and beginning our own research and monitoring effort. PSB's current research involves aerial survey adaptation, passive acoustic guidelines for offshore wind, and Southern New England North Atlantic right whale research monitoring on prey and habitat. Future proposed work includes more annual/seasonal wind monitoring, oceanographic modelling studies, fine scale shipboard studies on behavior, fitness, and biological processes, and developing data dissemination platforms.

Serious Injury Determination Policy Update with Focus on Random Forest Model for Large Whale Proration (NMFS - Lisa Lierheimer) - Lierheimer summarized the development of the NMFS guidelines for determination of serious injury. The policy was first applied to the 2013 SARs. Review of the policy every 5 years was written into the process. NMFS is currently working on this.

Jim Caretta presented his work on applying random forest modeling to create decision trees based on linguistic choices used in descriptions of serious injury cases. His process was able to predict death or decline fairly well. He and Allison Henry have co-authored a paper which is ??? in press?

Hayes asked if the people who write the reports need to be blind to the model input so they don't bias the results based on the words they choose to write. Caretta responded that most

people will report something with "I saw a humpback, entangled with 2 buoys." He doesn't think people will choose the word "severe" to make the injury seem "more severe." People writing reports or sharing information can write phrases such as "no blood is observed" or "blood was observed" so it's hard to use the key words "blood observed" as a predictor. There must remain a human aspect of this. Chen asked what the future plan is for utilizing this. Caretta said he has proposed using the Random Forest method and the current method together. We could have people upload a narrative and the model will send back a probability of predicting an animal's death or recovery. Allison Henry added that the more severe injuries are more likely to be in this data set with minor injuries less likely to be reported.

Review of Serious Injury Determinations - There were no comments about serious injury review.

Ropeless Fishing (NMFS - Henry Milliken) - Milliken presented updates on the ropless fishing initiative, designed to reduce or eliminate line in the water with fixed gear technologies, thereby reducing entanglement risks. Development of these new technologies is a collaborative effort with the fishing industry, engineers, NGOs, government agencies and academia. Fishermen are motivated by interest in getting back into closed areas, while other groups (including fishermen) are interested in solving the entanglement issue. Marine Stewardship Council certifications are being pulled and 'fish watch lists' are downgrading lobster/crab products from 'sustainable'. Seafood distributors want a 'whale safe' product.

The NMFS and NGOs are collaborating to buy on-demand gear but there is still a need for investors. Investing could come from venture capital, philanthropists, NGOs and government.

This work heavily involves the fishing industry as we feel they are the best to assess and provide feedback on the systems. Fishermen are being compensated for their efforts trialing the gear. In regards to costs, presently ropeless is expensive in both money and time. A ballpark cost is $125K if fishing 400 traps. Preliminary testing shows ropeless retrieval takes more time. But broadscale adoption by industry (i.e., increased demand) should lower costs and tech development and familiarity will likely reduce retrieval time.

Industry resistance to change varies by demographic. NMFS feels that getting ropeless gear in the hands of fishermen will help reduce misconceptions.

Ropeless presents challenges for enforcement. Enforcement needs to be able to see gear location. Solutions to "see" gear without buoys include improved vessel monitoring. Relatively inexpensive vessel tracking systems are being piloted by MA and ME. Enforcement issues already exist that ropeless would not exacerbate and might help, such as enforcement with heavy gear in offshore environments. Fishermen also need to see gear. Fixed gear fishers do not want to lay gear across each other and trawlers need to 'see' already placed gear to avoid it. Catching gear creates delays for mobile gear operations.

NEFSC is primarily concerned with solving the problems associated with the physics and design of the gear. The design needs to be improved to get gear to the surface, avoiding gear conflicts. NEFSC is also facilitating permits.

Acoustic releases have been used for science deployments for decades. Since 2017, there has been rapid development in acoustic release development that can be integrated into fishing operations.

NEFSC has been putting researchers on boats to help resolve operational issues. Every fishing operation is different and there is a learning curve that is best accomplished with trialing the systems before full utilization. We believe strongly that we need fishermen's input to develop what would work best for them. The best design is easy, safe, reliable, and affordable. NEFSC is focused on improving existing systems and supporting the development of new systems.

NEFSC is building a library of ropeless technology to help facilitate the continued development of the ropeless systems. The NEFSC covers most of the cost associated with storage, maintenance and transport. NEFSC has done a lot of testing and tracking. The data are shared/owned by all collaborators.

Ropeless development is not without problems. There have been application issues, line snarls and other issues, though we have not identified any problems with the acoustic releases. It is important that the applications being developed are reliable and easy to use for the fishing industry.

Implementing ropeless techniques will require technology on all regional fleets, including mobile fishing vessels, a central gear location database to avoid gear conflicts, and a "GoogleMaps" of seafloor traffic. Benefits include gear accountability, reduced ghost gear and gear loss, and the ability to "see" gear location 24/7. Successes will help ropeless development and endangered species conservation worldwide.

Chen asked if NEFSC was working with individuals or with fishing companies/organizations. Milliken replied that NEFSC has been working with the Atlantic Offshore Lobstermen's Association (AOLA), South Shore Lobster Fishermen's Association (SSLFA), and the Pioneers for Thoughtful Coexistence on ropeless system development. In addition, there have been communications with the Maine Lobstermen's Association and Massachusetts Lobstermen's Association regarding ropeless and weak rope development.

Chen also wanted to know if $125K was representative for 400 traps for the whole year. Milliken explained that the figure does not include upkeep (e.g., replacing lost gear). Costs can be reduced by increasing the number of traps per trawl. NEFSC economists are working on projecting cost estimates into the future but that is dependent on rates of adoption. Prototype costs are different. Asaro added that NEFSC economists might have updated values in a few months. The question was asked whether the development of ropeless technology was being expanded to other fixed gear types (e.g., gillnets). Milliken said they have started some

engineering ideas for gillnet gear, black sea bass pots and aquaculture gear but have not tested those yet.

Summers suggested NEFSC might look into a software company called Olex who make bottom mapping software and transponders to locate gear on the bottom.

Day 2: Tuesday, 23 February 2021

NARW Issues and Updates

GARFO Right Whale Recovery Efforts (GARFO - Dianne Borggaard) - The North Atlantic Right Whale was a "Species in the Spotlight" in 2019. There is a 5 year action plan in place. The Northeast and Southeast Implementation Teams (NEIT and SEIT) are providing input for this plan which should be available in March. The North Atlantic Right Whale scenario planning initiative (a framework used by the park service and others) looked at ocean conditions against human activity.

Moore asked if dynamic management areas can be made mandatory and what it would take to make that happen. Good replied that NMFS is investigating options but the ability to act quickly is limited. Canada has the ability to create and undo regulations more quickly.

Rule Making and ALWTRT (GARFO - Colleen Coogan) - This group started meeting in 2018 to consider feasibility of gear marking and risk reduction measures, followed by an October 2018 full team meeting to compare team proposals which resulted in a request for tools to help evaluate the relative benefits of risk reduction measures and to better describe how much risk reduction was necessary.

In April 2019, a target risk reduction level of at least 60% was established based on documented right whale serious injuries and mortalities, with an upper goal of 80% risk reduction that considered cryptic mortality. The goal was to make the established approach resilient to changes in NARW distribution. The Decision Support Tool was developed for use by the Team to compare risk reduction measures, although it was still going through peer review and changes during this process. Ultimately the Team recommended wide adoption of two approaches: (1) line reduction (assuming line frequency is a proxy for entanglement opportunity; if there is less line in the water the chance of entanglement is expected to decrease), and (2) use of weak line that breaks at 1700 pounds or weak line insertions at every 40 ft.

As further developed for rulemaking, two principles for alternative development were mentioned that were considered in addition to the Team's recommendations. The first was the need to recognize diverse fishing methods and conditions across the large area considered for regulations, and the second was to reduce substantial risk in areas of high co-occurrence with NARW and lines.

NEFSC NARW Survey Papers (NMFS - Dani Cholewiak) - Dedicated mark-recapture surveys appear to be very good at capturing individuals in the Gulf of St. Lawrence (GSL). Twenty-five individuals sighted during this period are known to be dead. Abundance is estimated to be 213 animals in that area. About 1/3 of the total estimated population was captured in GSL in 2019. 95% of the animals captured in 2019 have been sighted in previous years. The mean residence period is about 53 days, with a high rate of inter-annual return. The use of proposed New England wind energy sites by NARWs was discussed. Proposed wind energy areas are used by NARWs and there is a lot of animal interchange in these areas as compared to GSL. One highlight of 2019 was an aggregation of at least 40 individuals which seemed to stay in the GSL for ~15 days. Reproductive females were seen in the GSL and the area seems important for elusive individuals. A glider was used in collaboration with WHOI in 2020 and individuals were detected. The 2020 shipboard survey was cancelled due to COVID-19.

Decision Support Tool (NMFS - Mike Asaro/Burton Shank) - The Decision Support Tool (DST) is an expansion of the previous Whale Co-occurrence Model developed by Industrial Economics (IEc) and incorporates gear and vertical line density, gear configurations, and whale density at a 1nmi spatial scale, with monthly resolution. The tool allows for rapid, spatially-explicit assessment of the potential risk reduction associated with specified management actions and, thus, provides direct comparison between management actions.

The DST is flexible, with the capability of running multiple management actions simultaneously, allowing for visualizing interactions between management actions. The gear and vertical line density and gear configuration inputs primarily come from trip reporting data that typically lack fine-scale spatial resolution or the level of detail desired for this type of management tool and could be significantly improved with higher-resolution data collection. Rather than the Sightings-Per-Unit-Effort (SPUE) data previously used by IEc, whale densities and distributions in the DST are primarily informed by whale habitat models developed by the Duke Spatial Ecology Lab. These habitat models are derived from the SPUE data but provide improved density estimates and consistent spatial coverage.

Density models for humpback, fin, and right whales are currently available in the DST. The right whale model has been updated multiple times over the past two years to better fit the needs of the DST, address modeling artifacts and address concerns with temporal regime shifts in whale distributions.

While variations in gear configuration and the circumstances under which whales encounter gear are expected to be critical to the outcomes of entanglement events, there is little empirical data to support building the sub-model in the DST that relates gear configurations to entanglement risk. As a result, 'gear threat' is currently based entirely on rope breaking strength and derived from limited observations of rope strengths recovered from severe entanglement/mortality events and therefore highly uncertain. While the original DST was constructed to model the American lobster/Jonah crab fishery in New England, the domain and scope of the model is currently being modified to include all fixed gear (trap/pot and gillnet) fisheries on the US east coast from Maine to northern Florida.

Chen commented that the utility of the tool is based on the reliability of the DST model inputs. He wondered if any hindcasting of entanglement events has been done for model validation. Shank said the difficulty with that approach is that where the whale was seen entangled is not necessarily where it got entangled, making such validations difficult. NMFS is looking more into whale distribution uncertainty itself and doing some bootstrapping of alternative distributions. Chen thought more effort should be put into validation of the models and asked if NMFS had done any tuning of the models between the different versions. Shank said it was a good idea to try some hindcasting. Chen asked why month was chosen as the timestep, and wondered if it was possible to use different timesteps. Shank replied that a lot of the underlying data was in the resolution of month and resolution at finer scales would be data-prohibitive, potentially introducing error into the models. However, this could maybe be changed for other fisheries if there was both a demonstrated need and sufficient data. Chen asked if the tool could be used for forecasting and if different climate change scenarios had been considered. Shank said that has been discussed but not worked on yet. This would require projecting future distributions for whales and fishery effort.

Read commented that the tool might be useful for other fixed gear fisheries and other species, such as gillnets and seals. Merrick mentioned that the SRG had conducted a review of Dan Linden's work and suggested that his modeling approach should be more focused on Management Strategy Evaluation (MSE). Merrick said the SRG is supportive of both sets of tools.

Response to ASRG Intersessional Questions (NMFS - Richard Pace) - Pace reported that he changed the survival function to add the regime variable (0 was used for 1990 and 2010, and 1 was used for years after that) and had the following conclusions: 1) there was very little change to key parameter estimates (abundance, AF survival); 2) there was strong support for the hypothesis that life has become more precarious; and 3) that a declaration of UME is a result of more death rather than of better carcass detection or chance.

Merrick asked if Pace had modeled survival as well as mortality. Pace said the model is not only open to birth and death but also immigration/emigration. Calculating new entrants to the population is almost the same as calculating the birth rate but doesn't exactly match the number of calves because it includes animals that are never seen. The effect on juvenile survival is the same as the effect on adult survival.

Retrospective Analysis (NMFS - Richard Pace) - It is only possible to estimate alive or dead if an animal is not seen in the previous sample occasion and not known to be dead. Toward the end of the time series for the abundance estimate, the credible interval increases, and the expectation is that the last estimate will be biased low. Inconsistency comes from GMIF parameter; when you don't have a lot of data, you get a feel of the effect size of the regime. If tested in 2016, this would have thrown the regime parameter out because it would have not been measurable. After that, it becomes strong and informative. We are mostly finding the individual NARW for the effective effort; the more photos, the more unique individuals. This

decreases the chances that animals are cached away somewhere we haven't found. Merrick asked if Pace had any feeling for what the total number of captures were like in the last couple of years, noting that if there was a real change in the number of captures, that may say something about unique captures. Pace stated that the total number of captures were down for two years, and he estimated captures rates are also lower those two of the 5 last years in the data set analysed.

NEIT & PET PVA, Cryptic Mortality (NMFS – Richard Pace) - Pace presented updates on cryptic mortality estimation, commenting that most wildlife mortality is cryptic – what you see is not generally predictive of what actually went on in the population at the time and actual body counts are not very informative. The rate at which you see bodies varies over time and depends on what the whales were doing as well as what biologists were doing (surveys, etc.). Based on his model using data from the past few years, there is an increase in the total estimated deaths. PET presented on the non-lethal impact of entanglement wounds on reproduction. Evidence shows that if an individual gets a severe wound from entanglement, its chance of reproduction becomes near 0.

Manatee Updates (USFWS - Terri Calleson & JP Zegarra)

(placeholder here for presentation summaries)

Powell remarked that he looks forward to receiving the updated SARs, and asked how the revamping of FWC protocols for carcass recovery and necropsy processing will impact the data collected and ability to examine trends in mortality over time. T. Calleson reported that she and S. Calleson were involved in discussions with FWC and served on a review panel, but that they had not yet seen final changes in protocols other than knowing that there will be a reduced perinatal response. S. Calleson remarked that all carcasses would still be recovered, but the increase in mortalities will preclude conducting necropsies on all of them, and that a subsampling approach will have to be implemented. He noted that this could increase the risk of missing some potential human interactions. T. Calleson also noted that scaling back the necropsies may have direct impacts on the development of county-specific protection plans, which are currently heavily data-driven.

Powell asked about the reports of "sideways" swimming, wondering whether those animals have been rescued and/or whether they have recovered. T. Calleson reported that the individuals that have come into captivity seem to be emaciated and exhibiting breakdown of muscle tissue. She contacted local power plants to see whether there were anomalies in operations, but there did not seem to be, nor does cold stress seem to be the root cause. She reported that the veterinarians have been successful in rehabilitating animals with antibiotics, and that the main concern is where these individuals can be released.

S. Calleson reported that what is being observed in this UME appears to be very different from the UME that was triggered in 2013. More of these animals are showing signs of emaciation.

Powell commented that the decrease in seagrass beds all along the Florida coast are going to be a long-term issue.

Moore asked about post-rehabilitation individual survival. S. Callesan reported that they don't have exact numbers, but that some released individuals are tracked to see if they are returning to normal behavior and going back to warm-water sites; if they are doing well, tags are removed; if not, they can be brought back into captivity for additional rehabilitation. All animals in captivity are equipped with PTT tags, so that they can be detected in a necropsy if they die and are recovered.

Merrick asked whether the range analyses have indicated shifts further north. S. Calleson explained that anecdotally, there are more reports of sightings in summer months to the north, though this may not necessarily represent a range expansion. He commented that it is a common occurrence for animals to be seen from Texas to Delaware in the warm seasons, but still in low numbers in those ranges. T. Calleson remarked that there has been an increase in sightings in Georgia and South Carolina, reports of animals finding warm water sites, such as sugar plants, pulp mills, or power sites, near foraging habitats. As temperatures decline over the season, some animals have to be rescued from those regions; for example in 2017, 12 individuals had to be rescued from Charleston, SC. Calleson also reported that every year there is a carcass reported from Delaware, New Jersey or Massachusetts; this year it was Louisiana and Mississippi. Most of this information has been anecdotal. Animals have been learning about these "nuisance" warm water sites, and the numbers of individuals using them has increased.

Merrick commented on the Prescott program grants and asked about connections between NMFS and USFWS programs. S. Calleson reported that the projects that are funded are completely separate. Tripp explained that USFWS has recently started talking with NMFS to look for opportunities to align and leverage resources and do more targeted solicitations in a combined fashion. Merrick commented that many of the Prescott grants funded in 2020 for the US east coast could likely be applicable to manatees as well as cetaceans or pinnipeds. S. Calleson replied that the programs are not currently organized to overlap, but that does not preclude coordination with organizations that do cetacean/pinniped work as well as manatee work.

US Right Whale Budget Updates (NMFS - Eric Patterson)

Patterson presented a graph of right whale budget appropriations, showing a sharp upward trend. He also showed the obligation breakdown between science, management and cooperative state plan funding, with approximately $9.9M being split 50/50 between science and management and an additional ~$1.5M going to state support. Congress directed FY2021 funds to be used to: 1) Support innovative fishing gear technologies (no less than $1M); 2) Augment data collection regarding relevant fishing effort, distribution, and gear use; 3) Support disentanglement, stranding response, and necropsy activities; 4) Support aerial surveys and passive acoustic monitoring; 4) Work with Canada; and 5) Develop a habitat suitability index and long-term tagging methods.

Vessel Speed Report Update (NMFS - Caroline Good)
(placeholder here for presentation summary)

Moore asked if NMFS has looked at enacting speed limits that could be continental shelf-wide, that could achieve overarching benefit. Good elaborated that the coast-wide encounter risk rate model is looking out to the EEZ.

Merrick said that historic analysis found whales in southern GSC --> ATBA. There were a lot of battles with IMO and the White House to get this set up. Indications of recent sightings in that area or nearby (SNE), could use that as a bargaining chip.

Merrick asked if it is assumed areas need to be parsed out, can framework DMAs have a mandatory speed restriction instead of a voluntary speed limit. Powell mentioned that there is significant work on manatee vessel speed compliance and scar analysis that could be used to help establish conservation measures. Some from FWC are working on a recommended route compliance analysis. Knowlton & Costidis laceration work definitely refers/relies on manatee experience/research/data. Bettridge asked Merrick if DMAs could be made mandatory from the outset. Merrick replied yes. Hayes added that vessel traffic related to wind farm areas is something to keep in mind. Good stated that vessel speed compliance is definitely on the radar, not just during wind farm development, but during wind farm operation as well. One potential problem could be if a wind farm is using vessels under 65ft in length, these vessels could be classified as "right whale safe vessels" and not have to abide by the vessel speed restrictions.

Zoodsma asked Moore if the danger areas might not be revealed through traditional risk assessment. Zoodsma mentioned the recent calf strikes in FL. Moore said to look at it from a whale's perspective and not the boat's perspective. For the whale, vessel strikes are happening frequently. Zoodsma suggested plotting where the strikes are happening. Moore thinks it is a modelable situation looking at the overlap of ship and whale densities. Laist & Knowlton paper was misleading. It is easier to predict where vessels will be than where whales will be.

Good asked how resilient the vessel strategy is intended to remain over time. Should it be flexible and revised every few years or should it be set and left alone? Good generally agreed about vessel traffic predictability, but mentioned there are surprising changes and unexpected circumstances that could crop up. Moore thinks to set it and forget it would be more pragmatic (true for fishing as well).

Canadian Science and Management Update (SRG - Jack Lawson)
(placeholder here for presentation summary)

Merrick asked for clarification on the DFO NARW budget. Lawson said it is $3M for the aerial surveys and he is awaiting details on the remaining budget details. Lawson acknowledges other SAR species are being neglected.

Discussion of North Atlantic Right Whale Stock Assessment Report (SRG)

Merrick was concerned that the statement about total mortality in the last paragraph should include cryptic mortality now that this has been published. There was discussion on how that should be reported in the SAR, and how to keep it consistent with the ESA guidelines. The SAR can provide more scientific advice to managers than it is currently doing. Read agreed with Merrick that the SAR should cite the cryptic mortality paper. Also, since we now know that total mortality is worse than the body count, that statement should be included where the SAR discusses the fact that the mortality numbers are biased low. Lawson agreed that the cryptic mortality should be included. Kenney also agreed. He said a significant component of the take reduction team isn't going to like this, but they've been warned for years that this is coming. Moore said it is important that Pace's paper shows the majority of cryptic mortality is from entanglements. He said his paper on sinking carcasses should also be included because it backs up the model's claim. Summers agreed that cryptic mortality should be included but the question that remains is how to assign the apportionment. Hayes said NMFS hoped to be further along in the apportionment. Pace has done some additional analysis since his paper has come out. We're focusing on detection bias as well as working on improved national apportioning. Read said there is a reasonable middle ground that can be staked out by saying there is a significant amount of cryptic mortality. Recent distribution shift makes it unfair to stay with 50/50. We need to do more work to figure out apportionment. Merrick said we have Pace's work that says 87% of mortality is due to entanglement and Dan Linden's model cited in the BioOp that puts that figure at 78%. This is germane to the accounting against PBR by NOAA and the TRT - in particular see Table 57 in the BiOp. Also, the recommendation has been that at least for now, the takes are split 1:1 between US and Canada. Kenney said we can safely say more than half of the mortality is due to entanglement, but we can't put a real number on it since different sources say different things. What we say is a bare minimum – we can cite the numbers and the papers and say we don't know for sure.

Merrick came up with the following proposed wording on this for their recommendation letter: "The ASRG commends NOAA for the inclusion of a total mortality estimate (i.e., effectively the sum of observed and "cryptic" mortality) within the NARW SAR. The ASRG recommends that NOAA reconsider the 1:1 apportionment of mortality between the US and Canada based on recent observed M/SI. Also, the ASRG recognizes that there is likely more M/SI resulting from entanglement than vessel strike, and recommends that NOAA review analyses by Pace et al. (2021), Linden (2020), and Moore et al. (in press) to assign an interim apportionment by source of mortality to the 2020 SAR." Read proposed saying "cause of mortality" instead of "source of mortality." Kenney suggested adding Hayes et al. 2019 but Hayes said the data have changed since that was published. Summers suggested adding Sharp et al. 2019 to the list of papers. Lawson said he would prefer a stronger word like "reassess" over "reconsider".

Day 3: Wednesday, 24 February 2021
Gulf of Mexico Shrimp Fishery Bycatch Estimates 2015-2019 (NMFS - Melissa Soldevilla)

Soldevilla updated the group on the Gulf of Mexico Shrimp Trawl bycatch estimates. Overall, a lot of the methods for the 2015-2019 estimates are still the same as those used in Soldevilla et al. 2015 and Soldevilla et al. 2016. The shrimp trawl fishery is a large fishery with ~4000 fishing vessels; 1400 are federally permitted, the rest are state permitted. The NMFS fishery effort data are collected at a finer scale, but they put data out in 4 statistical areas - TX, LA, AL/MS, and FL with 4 depth strata and 3 seasons (trimesters). Total effort is nominal days fished, stratified by statistical area, season, and depth. One of the big challenges with the shrimp fishery data for estimating otter trawl bycatch is that it incorporates both otter and inshore skimmer effort in LA, AL, and MS (there is limited observer coverage of skimmer trawls to estimate skimmer trawl bycatch). To estimate only otter trawl bycatch, inshore skimmer effort was removed from total effort using shrimp landings data, under an assumption that shrimp CPUE is equal for otter trawl and skimmer trawl gear.

Soldevilla explained observer program data and how it is used to calculate bycatch per unit effort (BPUE) as observed takes per hour fished. While the program observes 1-2% of the federally permitted vessels, average coverage for the total fishery, including state and federally permitted vessels, is 0.7%, primarily due to limited coverage of inshore waters. The Observer Program only observes inshore state waters if a vessel holds both a state and federal permit. Overall for 2015-2019, the mean observer coverage was 0.67%; notably, observer coverage in 2019 was low (0.46%) due a change in observer provider contract. To improve issues with lack of inshore coverage noted in previous years, a MARFIN-funded pilot study expanded inshore coverage under MMPA and ESA during 2015-2017 and 2019.

For the otter trawl fishery, 59% of effort occurs in LA waters and 21% occurs in Texas waters. Forty-four percent of effort occurs from May to August while 41% occurs from September to December. Effort is broken down into inshore (41%), offshore (33%), and nearshore (26%).

Soldevilla noted issues discovered in the fisheries landings data this year that impact the prior 2016 analyses; 2014-2016 effort inshore effort estimates in LA, AL, & MS were incorrect and have been corrected and bycatch estimates updated. The 2014-2016 effort and bycatch increased from what was previously reported. In addition, historic observer program data have undergone QA/QC since the previous analyses; some effort location corrections led to small BPUE changes in the recalculations of prior year's bycatch estimates.

Soldevilla reminded everyone that fishery effort is calculated based upon state area boundaries that do not correlate exactly to stock boundaries. We end up lumping BSEs to match fishery effort strata, so we report bycatch for Texas, Western LA, Eastern LA/MS/AL, and Florida (4 areas). She noted the Northern Coastal Stock is poorly matched to AL/MS nearshore strata; it extends into inshore AL/MS and nearshore FL.

Since the observer program's inception in 1997, there have been 22 observed mortalities and one take released alive. Since 2015, there have been eight mortalities. They tend to get entangled in the lazy line most commonly, and then in trawl nets. Species ID has been improving overall. We still do have two unidentified dolphins in recent years. While there are no

observed takes of Atlantic spotted dolphins, observers see them around the vessels and there are historical public reports and research fishery reports of mortalities. Based on the proximity to the Atlantic spotted dolphin distribution boundary, the distance covered over the course of a trawl, the fact that Atlantic spotted dolphins may move inshore in spring, and the fact that dolphins are known to be attracted to shrimp vessels, SEFSC scientists determined it is possible the unidentified dolphins could be either bottlenose or spotted dolphins. Note, we had one observed take in inshore waters (2018) as a result of the MARFIN-funded pilot study.

Soldevilla discussed that we have the problems of over-stratification, low observer program coverage, and rare events in a large fishery, and we need a way to handle over-stratification for the number of observed takes. There are 24 shrimp fishery effort strata: 4 stat areas x 3 trimesters x 2 depth zones (no inshore observer program coverage). Pooling data over years is best due to low variance among years, and pooling over area is the next option as the next least variable strata. This is our 3rd time estimating bycatch - as we continue in future years, how far back do we continue to incorporate the data from the observer program for pooling?

The 2015-2019 annual bycatch estimation 1) pools over 20 years of data, 2) uses two stratification methods: 2-area (western vs eastern) and 4-area, 3) imputes nearshore bycatch rates to inshore strata; and 4) incorporates best-case and worst-case species ID scenarios. For use in the SARs, we chose the 4-area model with the worst-case scenario for common bottlenose (Tt) and Atlantic spotted (Sf) dolphins. The highest concern was for LA BSE and AL/MS BSE stocks which may be greater than 50% best-known PBR and 100% of best-known PBR respectively. Three stocks (western coastal Tt, shelf Tt, Atlantic spotted) were of moderate concern (between 10-50% of PBR).

Data limitations and assumptions are the same as in previous bycatch estimates. Regarding limitations related to dolphin biology, Soldevilla listed outdated BSE stock abundance estimates, spatial mismatch in stock delineations versus fishery strata, unidentified species identifications, and animal disposition (alive, "decomposed"). Regarding observer coverage, the data are limited by low observer coverage overall, the coverage was voluntary only during 1997-2006, inshore coverage is limited, and coverage of skimmer trawls is limited. Regarding fishery effort, there is low resolution in inshore waters compared to stock boundaries, and the inshore effort combines skimmer and otter trawls.

Efforts were made to better understand inshore observer coverage given the recent MARFIN-funded pilot study. Looking at the Inshore observer program coverage, 41% of otter trawl effort occurs in inshore waters, and 55% of inshore effort is from skimmer trawls. We are not estimating bycatch at all for skimmer trawls. There is limited observer program coverage of inshore waters. The program only observes state-permitted nearshore and inshore vessels that also carry federal permits.

Soldevilla pointed out the concern of bycatch is not only for marine mammals, but also for sea turtles.

Regarding the inshore observer program coverage, from the in-house NOAA MARFIN program, observer coverage was conducted in 2015-2017 and in 2019. The goal is to observe 75 sea days per year. We need to estimate and compare CPUEs for nearshore vs. inshore waters. The inshore observer program observed 385 inshore otter trips and 175 inshore skimmer trips. Something that could be done is to see if we can estimate the CPUE by gear type.

Soldevilla discussed the LDWF Trip Ticket Program Data for 2011-2018. She is not comfortable with a full quantitative analysis incorporating these data because LA provides them as number of trips, so there's a conversion to number of hours fished per trip. She does not know if that varies by basin or season. For example, are there more trips in Barataria and Terrebonne because there's truly more effort there or because they do more frequent, shorter duration trips? A review of the limited observer program data provides some information here, but really we just need this data collection to continue, ideally at higher levels. We also make so many assumptions about bycatch rates that it's hard to believe we can divvy things up at a finer level anyway. Right now the assumption is equal bycatch rates in each BSE water body which are equal to the nearshore rates in the corresponding stat area/trimester stratum. In reality, she imagines bycatch rates within BSEs vary by dolphin density as well as effort levels and that even if we knew the effort at finer resolution, there would still be a huge amount of uncertainty to estimating total bycatch by stock.

Looking to future improvements, there should be new BSE bottlenose dolphin abundance estimates forthcoming for Alabama (Mobile Bay/Bonsecour Bay and Perdido Bay) and possibly Louisiana (Calcasieu Lake?). There is limited MARFIN funding for inshore coverage of shrimp fishery, but it isn't yet sufficient to be estimating BPUE. Could a coastal electronic logbook program be used similar to what is used in offshore waters in inshore waters? There is still the question of how many years of observer data to pool over.

Read asked if the plots comparing bycatch with PBR were all worst case scenarios. Soldevilla affirmed. Merrick asked if Soldevilla had talked with Palka or other folks in the NE about how they're dealing with the issue of pooling observer coverage. Soldevilla said she hadn't talked to Palka lately. She said she knows folks out west have recently used Bayesian models. She has been talking to one of the researchers at University of Miami who does this with sea turtle estimates. Merrick encouraged Soldevilla to coordinate with the NE since these are all part of the Atlantic SARs.

Powell asked for definitions of skimmer trawl and lazy line. Soldevilla explained that otter trawls are the typical trawls; a skimmer trawl is closer to the vessel and it rides higher in the water, so it is a very different gear type. The lazy line is used to pull the cod end on board while trawls stay in water. ~60% of takes occur in the lazy line. Skimmers also use a lazy line and an entanglement has been reported through the stranding program.

Chen asked if fishermen's self-reported data was included in the analysis. Soldevilla replied that the BPUE is completely from the observer program because we don't have any effort data for public reports. The data that goes into the stock assessments does include other reports.

Wells commented that the low observer coverage is discouraging and asked if NMFS has any sort of threshold value at which the data don't seem usable, or is it just whatever you have you use. Soldevilla explained that the observer program is used to meet the fish bycatch reporting requirements under Magnuson-Stevens. That bycatch is not rare. For dolphins and sea turtles, bycatch is rare, and we're just using what we have.

Engleby added that another issue with the skimmer trawls is that the dolphins like to bite holes in the nets. This is a real frustration to fishermen. We tend to see gunshots and lethal deterrents as a response, especially in Louisiana. Additionally, fishermen have expressed interest in trying to reduce risk of bycatch in the lazy line. SER is looking at restoration activities that might help address some of these issues.

Merrick said, for frame of reference, 1-2% observer coverage was typical in years past. The number of trips observed is important, as is the randomness of deployment. Soldevilla said part of the challenge is that it's such a large fishery and the relative marine mammal bycatch rate is low. Merrick pointed out that if you have a big fishery and 1-2% coverage, you can cover a lot of trips with that. Chen agreed that the absolute number is more important than the percent. Given the historical data that you have, can you run a simulation study based on the coverage you've had in the past and see what happens if you have a different effort level? Some kind of simulation study to evaluate effectiveness of this design would be beneficial. Soldevilla said NMFS has done a bit of that to try and increase coverage in inshore waters. We've looked to try and get a sense of what that looks like; how many years of data do we need to pool vs. what level of coverage do we need to achieve in a single year. We've done some of that for inshore waters. Depending on what kind of CV we want to achieve. 5-10% observer coverage if we want answers quickly; if we can wait longer-term, we can do 1-2% coverage. I haven't done that for the whole fishery.

Nesslage asked Garrison if he had anything else to add? Garrison said no, but that he wanted to go over this because these estimates have been incorporated into the SARs that are about to be discussed.

SEFSC SARs Discussion

Bottlenose Dolphin SARs - Merrick asked if the ASRG had recommended 31 individual bay, sound, and estuary (BSE) SARs. Garrison didn't recall. He said as SEFSC has been improving assessments, and as we have more info, we've been pulling stocks with unique impacts into their own reports. Merrick said writing additional SAR chapters with a lot of duplicated information is not a productive use of your staff and referred to what AK did with harbor seals. AK had 12 stocks and separate SARs for each, but a few years ago decided to bundle them all together. Garrison said the SEFSC has been trying to balance that issue. For a stock like Galveston Bay, where there are specific habitat issues like oil spills, someone will want to look at more details for that stock before building a large wall across the bay opening, for example.

Read said he thought the SRG had encouraged the SEC to move to individual BSE SARs because some of those stocks have pressures that are unique. He thinks they are moving in the right direction because there will be a point of diminishing returns. In a future meeting, it might be worth going through the 31 BSE stocks and seeing if there are others we should highlight. Maybe that's a topic of discussion for the SRG in the future. Merrick said he was scared by the idea that they'll be 31 individual GMx BSE SARs that we all have to review. Wells said he was comfortable with the approach that Garrison et al. have been taking so far. We should let the data be our guide.

Gulf of Mexico (GMx) Bottlenose Dolphin BSE SAR (Chen's comments)
- 23 stocks in this assessment (not 24 as indicated in the report) - editors to check this.
- Given all the issues related to the lack of updated stock estimates, Chen wants to see a plan to update this SAR in the coming years.
- For some stocks, how can seasonal movement influence the stock estimates? Should the resident and migratory individuals be estimated separately for a stock (if both exist)? Garrison responded that there are resident animals in an area that are counted, and there are transients that come in and out. There is also spatial overlap. There are a number of different ways to deal with this issue. For West Bay, there were data about animals also seen in other areas. For Choctawhatchee Bay, there was an analysis by Conn et al. to estimate transients. We've tried to use winter/lowest estimates - this is a challenge we have across all BSE SARs. We've tried to be pretty consistent in how we do it, but it is challenging. Sirovic asked if these issues only apply to BSE stocks, or continental shelf and/or coastal stocks? Garrison said it's a bigger challenge for BSE SARs. If, for example, there is a stock of 200 BSE animals and 20-30 from a coastal stock join. That's a bigger challenge for BSE estimates b/c they are more disrupted by outside individuals as compared to bigger stocks with thousands of animals.
- Are there any issues with mis-identifying common bottlenose dolphins? Garrison said that in the estuaries, it is not as issue, but it can be if efforts are from aerial surveys in shelf waters.
- If each stock is separated with limited movements/exchanges among stocks, can each stock sustain themselves? How reliable is the genetic work in defining stock structure? How reliable is the information on movement? Rosel stated that they haven't looked at every single BSE stock yet, but for the stocks they have studied in the Gulf, very strong genetic differentiation exists between stocks. There is generally less than the 10% threshold for demographic independence. There are good sample sizes and reliable set of markers. Chen asked if that meant there is limited genetic exchange. Rosel replied that there is a low enough level of genetic exchange that the populations are demographically independent. The internal population drivers like birth and death rates are what is determining the population's trajectory over immigration/emigration. Chen asked if morphology has been considered. Rosel said that for BSE stocks in the Gulf there may be one paper that has explored this by comparing TX to FL. They found some skull morphological differences, and were not looking at external morphology. There are behavioral differences like feeding strategies that differ across some

estuaries, such as mud plume feeding, bubble net feeding, etc. which reinforces the evidence for differentiation.

West Bay Bottlenose Dolphin BSE SAR (Chen's comments)
- How do you define a design as "robust?" Garrison replied that it is a specific CMR design in which the population is assumed to be closed (Pollock's robust design). Rosel said they can add a citation for this. Chen said it would be good to have this defined a bit better.
- Two versions of computer programs were indicated in the report. Mark 8.2 and Mark 9.0. Chen wants the writers to check which one was actually used.
- How reliable is the stock structure delineation? Rosel said that they haven't collected genetic samples in West Bay. There is not a genetic stock structure analysis in that area. Chen asked if they considered life history differences among different stocks. Rosel said stock specific life history data are not available.

Galveston Bay Bottlenose Dolphin BSE SAR
Sirovic said this is the first Galveston Bay SAR. There is a long history in this SAR of strandings back to the 90's. Other SARs include data from 2015 onwards. Sirovic asks if this SAR needs to be this comprehensive or if it should be a reflection of the current situation. Foley states that presenting historical UMEs for a stock area is typical.

Barataria Bay Bottlenose Dolphin BSE SAR
No comments

MS Sound Bottlenose Dolphin BSE SAR
Merrick had two substantive comments. The first suggestion was to move part of the trends text up to the abundance discussion. A pair-wise comparison doesn't seem to be a robust way to look at trends. Garrison stated that comparing 2 numbers is not really a trend. This will be looked at to see how the text can be reorganized. Merrick reiterates that it's awkward to call this approach a trends analysis. The second concern is in the Other Mortality section. The DWH model predicted a 62% decrease in abundance, but comparing the trends, there is no difference. Garrison said they could compare the 2017-2018 survey abundance estimate to the model estimate.

Eastern Coastal Bottlenose Dolphin BSE SAR
No comments

Northern Coastal Bottlenose Dolphin BSE SAR
Sirovic commented that the Northern Coastal and Continental Shelf SARs have the same trend and data issues that Merrick just mentioned for the MS Sound Bottlenose Dolphin SAR. Read has the same comment as Sirovic.

Read mentioned that there are other stock structures that are known to exist. In a very complicated landscape, more variability is about to be introduced, so what is the plan going

forward? Will there be more sampling? Rosel replies that some areas will require more sampling. There are some sampling gaps, like on the West Florida shelf. Second, in order to re-delineate the stocks, boundaries must be established. Establishing these boundaries will require significant habitat modeling work to pull in the best variables. Third, NMFS has a new stock definition policy directive in place which would need to be addressed to write separate SARs, for example. Read stated that this is an enormously complicated process. It's in some ways similar to the Atlantic shelf with a lot of uncertainty about boundaries and existence of stocks. Maybe this issue of difficult-to-define stocks and how best to look at/define their boundaries would be a good topic to discuss in order to benefit the SE projects.

Nesslage had a question about Nmin. Foley stated they will double check the number, but believes the number reported is due to rounding differences. Garrison stated they should decide how many decimals to use. Nesslage thinks SE and NE could use the same rule in these SARs.

Western Coastal Bottlenose Dolphin BSE SAR
Chen said he would like to see a plan to update this assessment. Is there movement or possible exchange with other stocks? Garrison said they have taken seasonal estimates and averaged across those boundaries. Through GoMMAPPS, they are doing a lot more spatially explicit modelling and have a better idea of seasonal variability. Chen said that in fisheries, they do sensitivity analysis. Can this be done with bottlenose dolphin stocks? Is the assessment sensitive to different assumptions? Garrison said they would think about it, and they would have to seriously consider how to do that in order to implement that idea well. Rosel asked for clarification on what Chen wants for an updated assessment since this SAR has an updated abundance estimate already. Garrison explains that the 2018 survey is the latest survey and at the moment, there is no plan to run the surveys again. Previous surveys were in 2011/2012 (DWH/NRDA) and 2017/2018 (GoMMAPPS). Prior to that, there was a 2007 survey and a 1992-1996 survey. There is not a very good time series for these data. Chen asked for clarification as to whether surveys are run largely based on the availability of funding and if there is a long term plan for future survey work. Garrison replied that it's based on funding, but the ideal interval for surveys would be about every 3 years to capture trends in the data, but they have not been able to sustain that effort.

Merrick stated that his two comments for the MS Sound Bottlenose Dolphin stock are relevant for this stock also: pairwise comparisons of trends and the DWH model. The third comment is regarding observer coverage of the menhaden purse seine fishery. There is no observer coverage and there have been documented takes. Does the center feel like it would be worthwhile to have the ASRG recommend observer coverage? Garrison said that it is a difficult fishery to observe and suggests Horstman answers. Horstman says there have been quite a few self-reported takes - six in one summer recently (2018). There was a pilot observer program in 2011 where 3 dolphin takes were observed, but traditional observer coverage is not really feasible in this fishery. There is an open-ocean DWH Restoration project for sea turtles looking at alternative ways to observe the fishery, such as UASs, different places of observers on the mothership, etc. These ideas are in the implementation stage and they are hoping to learn more that would also benefit marine mammals. Merrick suggests that the SRG consider supporting

the effort to develop a program to observe the menhaden purse seine fishery. Nesslage states that as Horstman pointed out, it's a difficult fishery to observe. Horstman said they were approached by the Gulf of Mexico menhaden purse seine fishery a few years ago seeking observer coverage for their Marine Stewardship Council certification. It was a great dialogue between parties on ways to kickstart this concept but did not move forward at the time. Read stated that the willingness of the fishery to take observers depends on their political affiliations and what they need. He believes Merrick's point is valid and the SRG should point out that there is a need for observer coverage in the Gulf of Mexico and Atlantic and support Horstman's and others' efforts.

Continental Shelf Bottlenose Dolphin BSE SAR (Chen's comments)
Are there plans to revise this SAR? Chen questions the wisdom of including the trend analysis, based on only two estimates. Garrison asked what the recommendation is. Should they compare the two estimates and/or include the two estimates but change the language? Read stated when the comparison provides some insight, he believes it is useful to put it in the SAR. Otherwise, trend analysis based on two estimates where there's uncertainty about stock structure is not helpful. Perhaps this information can go in the Other Mortality section. Garrison asked for clarification that they want the two estimates in the trends section, even though they won't analyze the two trends since that is not enough data to make a substantiated conclusion. Read confirmed that is the recommendation.

Chen noticed different detectability among surveys, stating that the individual surveys cannot be directly compared. Garrison said the differences in detectability are accounted for in the methodology. There is standardized methodology across all SARs. It's a question of if the differences are in the methodology or the interpretation of results or both. In this case, the differences are turning up in the interpretation of results. Chen stated that this may not be an absolute estimate of stock abundance and instead it is more of a relative estimate. Garrison said he accounted for probability of detection during the surveys. There is a different portion of the total population within each survey area from one survey to the next. That is the part that has not been accounted for.

Wells stated that the SRG has pushed hard for quite a while to look at trends. We're now dealing with the reality of the current data, and it's going in the right direction.

Merrick stated he is still uncomfortable including those 2 estimates (discussed in the first bullet point) in the trends section. Putting this info in the Other Mortality section seems strange as well. Garrison stated that normally the numbers reported in the abundance section are the ones used to calculate Nmin and PBR. In the trends section, they want to include some info beyond the 8-year scope. Merrick stated that the old abundance estimates are no longer appropriate, but there is no documentation for that unless someone finds the tech memo. Rosel stated that the GAMMS guidelines are pretty prescriptive about what is in each section, and she is concerned about putting a trends paragraph under the abundance section. Rosel wonders if trends info for all the separate bottlenose dolphin SARs could be in a center reference document. The trends section for the individual report could say there is no trend since there are

only two data points, but reference this center reference document for the details known. A better sentence explaining this issue is needed. Merrick says that based on just these two data points, there is not a way to say whether there is or is not a trend. Garrison said that the draft aerial survey report and vessel report have all the trends info already, so a new document does not need to be created and those two reports could be referenced instead.

Atlantic Spotted Dolphin SAR
Read had the same point as before, which is that we have more structure with this species than is reflected in the SAR.

WNA Short-Finned Pilot Whale SAR (Chen's comments)
Chen stated that there is unclear stock structure and movement. The impacts of this on the SAR need to be discussed.

Chen mentioned that there is potential for mis-identifying this species, as it's similar to the long-finned pilot whale. Garrison replied that there's a portion of their range in the northeast where they overlap. So within that area, for the abundance estimate and mortality estimate, the data from biopsy samples has been used to help determine the probability of encountering or mis-identifying a short- or long-finned pilot whale. The biopsy samples for that analysis were collected in 2013-2014, so it's possible uncertainty is introduced if those numbers are no longer an accurate representation of the current populations. So far, however, the model seems consistent. Short-finned pilot whales are moving further north. There are some seasonal movements of short-finned pilot whales, especially in winter months when they are further south. Read raised a stock structure question in the past: Is this one Atlantic stock and one Gulf stock, or is it one Gulf, one Caribbean, and one Atlantic stock? There are some samples to work on this question and it will be revisited as more data becomes available.

Chen noted that the most recent estimate for the current population trend was in 2016. He does not see this as a "current" estimate. Garrison replied that he is hopeful they can get another estimate this year. It is unknown with COVID and ship regulations. They seem to be on a 5-year schedule through the AMAPPS program and hope AMAPPS continues so they can get a new estimate every 5 years.

Moore asked for clarification on the long-finned pilot whale question. Was there any analysis of the stranding record through time as to whether the 42 degree split is still accurate? Garrison said that to his knowledge, no one has looked at the stranding record. They are relying on a habitat-based model working off of biopsy data. If there is seasonal warming, that would be reflected in the way groups are divided, because SST is used for any given take. Moore stated that given the obfuscation of the morphometrics, any thread might be worth looking at. Read stated they were looking at the stranding record for short-finned pilot whales. It's more variable spatially than the model Garrison has been using. One would expect more wandering from animals that end up on the beach. They aren't sure this approach/data is informative of what needs to happen. They are supportive of the way the centers have done this in the past. Garrison said it would be wonderful to get out and do another biopsy sampling survey and

update the models. Moore asked why don't those data get used. Garrison stated he is using that data. Moore said the latitude factor hasn't changed. Garrison said the analysis is not based on a particular split reliant upon the latitude line. Moore says in the report it states that "north of about 42 deg north, most pilot whales are long-finned." Garrison says they will look at that language in the SAR.

NEFSC SARs Discussion

There was discussion of general issues that pertain to all reports. The first point was to be consistent in the number of decimal places reported for Nmin and PBR. A second point concerned the need to do a large biopsy survey in the Atlantic to get more genetic samples since distributions are changing. The ASRG also considered the value of adding another section to all SAR chapters that identifies potential issues and prioritizes future research projects.

Long-finned Pilot Whale SAR
The SRG suggested NMFS consider looking at bycatch data to help confirm that the divisions between the short-finned and long-finned pilot whales is consistent with the original study. There is indication that short-finned pilot whales are moving northward. There was also a request to update the strandings and bycatch estimates from Canada.

Fin Whale SAR
Lawson said to make sure the reference about different call patterns of Atlantic fin whales is included in the stock definition section. Another suggestion made by the SRG was to add more details on Page 4 about cryptic mortality.

Sei Whale SAR
No major comments.

Minke Whale SAR
Moore suggested adding acoustic data to the distribution map. This was discussed and NMFS said they would make sure the distribution section includes published results from acoustic recordings.

Common Dolphin SAR
The SRG recommended making sure the description of the 2016 abundance survey says there was not only no overlap between the three surveys but there were also no gaps in coverage.

Harbor Porpoise SAR
No major comments.

White-sided Dolphin SAR
The SRG suggested NMFS reconsider the text about a gap in the animal distribution on the Scotian shelf if there is no longer a gap. Is the stock just in US/Scotian shelf waters or from Florida to Newfoundland? If up to Newfoundland, then more information should be provided on Canadian bycatch.

Risso's Dolphin SAR
NMFS should double check the abundance and bycatch numbers are correct in text and tables and update publications that are in review in bycatch and abundance.

Gray Seal SAR
The SRG felt that the population abundance, Nmin and PBR should be estimated over the full range of the stock because genetically the US and Canadian animals are from one population. Ideally the SAR should compare US and Canadian combined bycatch to a single PBR estimate. However, we don't have Canadian bycatch and need to know more about the movement rates between US and various parts of Nova Scotia to determine the best number of animals that use US waters. Ono asked if NMFS could make two PBRs: a range-wide one, and then one just for the US animals/fisheries. An interim strategy until better data are available is to parse out the stock-wide PBR into US and Canada based on the percentage of pup production in each respective country (6% US and 94% CAN). This results in a similar PBR to what is used now. Long term recommendations should be made to gather more data on movement rates to help apportion the stock-wide PBR into US/Canada portions.

Moore and Read mentioned that the default value of Rmax was changed for the harbor porpoise, so there is a precedent for this. Read suggested that we need more information and perhaps PBR should be set to unknown, but Murray said she did not want to revert back to an unknown PBR when information is available, especially with bycatch spiking right now.

Moore said serious injury (necklaces but still alive) from strandings should be included in the SAR. NMFS should talk to IFAW to get the results from their necropsies, and ensure that animals are not double counted year after year. Palka said if there are dead strandings in an area and at a time that we already have a good bycatch rate for, they are subsumed in the total estimated bycatch, so if strandings were attributed to fisheries, we would be double counting. Murray said there is some text in there about the issue of sub-lethal entanglements, but we need better reporting in order to quantify this.

DeMaster said that if the SRG wants longer term data, trend data are useful. Trend data can be used to figure out what the PBR should be.

Palka asked for clarification on which Rmax value the SRG recommends using, the default of 0.12 or 0.141 from the SCEMFIS research. Read said that the SCEMFIS work has not been peer reviewed or published, and until then, NMFS could use the 0.128 rate published by Bowen et al. 2003 based on the growth rate on Sable Island. Murray pointed out that the rate is much larger than that on US colonies, and the current rate on Sable has slowed to ~4%.

Harbor Seal SAR
Ono commented on the new additions from Sigourney's analysis. She said the results showed no significant population decline, so the SAR text is misleading and should be revised. Murray said the text states it's not a significant decline and included the graphics for the reader to interpret. The plot indicates there was no real change, but the text says there is a decline that is not statistically significant.

Merrick suggested adding more text to explain the extent of the survey (focused on Maine), and that the numbers may be an underestimate if pupping is occurring in other areas. The current language in the text could be strengthened to make the point that if other areas are used for pupping, the abundance estimate may be negatively biased. Chen was also concerned about this possible underestimation. Murray said that it is possible that we don't know if all the pupping areas have been captured. The northern part of the range is not captured, and there is potential for pupping areas further south, too. The SAR text does state that reconnaissance flights are needed. Merrick asked if the 2 estimate average in 2018 was from the Sigourney et al. results. Murray said, yes, it's referenced.

Harp Seal SAR
PBR was not calculated, but it should be. The SRG said NMFS should consider this stock as a typical transboundary stock so it should estimate PBR. However, unlike the situation with gray seals, there is no abundance estimate for both the US and Canada, so a stock wide PBR would mainly reflect a PBR for Canada. There is also no bycatch information for Canada, so in the end, US takes would be compared against a Canadian PBR. There is no clear guidance on this. Richard Merrick noted that methods to determine PBR for transboundary stocks should be consistent.

Harbor Seal Trend Modeling (NMFS - Douglas Sigourney)
Sigourney presented some results from a trend analysis study he has been working on in collaboration with Kimberly Murray at the NEFSC. They applied a Bayesian hierarchical modelling approach to estimate trends in both pup and non-pup harbor seal abundance along the Maine coast from 1993 to 2018. They also calculate an abundance estimate and Nmin for 2018 the most recent year of survey data. To adjust observed counts they included information on environmental conditions and prior information from separate tagging studies on seal haul-out behavior. Estimated trends suggest there is some evidence that abundance was increasing until 2001 but this trend was not significant for non-pups. There was considerable uncertainty in abundance estimates as they used several methods to calculate availability from haul-out behavior.

Although a lack of precise information on haul-out behavior and a relatively sparse dataset resulted in high uncertainty in abundance estimate, there is evidence that this stock is no longer increasing and trends in abundance are relatively flat. Possible mechanisms for this lack of change in abundance could be competition with gray seals, a general migration out of the study area or that the stock has simply reached carrying capacity. The manuscript is currently in revision at Marine Mammal Science.

Merrick commented that this work presented a nice step towards providing important/needed information on population dynamics for this stock of harbor seals. He also commented that it was good to see collaboration across science centers as Jay Ver Hoef from the AFSC is a co-author on the manuscript.

Ono commented that the high uncertainty in the estimates makes it difficult to identify mechanisms behind the population dynamics. Sigourney mentioned that there is strong evidence of a rapid increase in abundance from the 1970s until about the 2000s but combined with this analysis the evidence seems to be strong that the trend is flattening out. Also, noted that there were several Unusual Mortality Events (UMEs) during the course of the study but there is no strong evidence that these UMEs negatively affected the abundance trend. Ono noted that UMEs might be the mechanism that keeps the stock from reaching carrying capacity.

Read asked Sigourney for future recommendations in survey design. Sigourney mentioned that more years with surveys would be optimal but if resources are limited the focus should be on multiple surveys within a year. Such a sampling design would provide useful information on observation error and would help model the relationship between seal count and environmental conditions.

Lawson commented that in their Canadian surveys they included multiple surveys within a year. Lawson also asked if the study looked at distance to nearest gray seal colony. Sigourney responded that they did not look at that but it would be possible to look at trends at the bay unit level and see if there was influence in trends as a function of distance to nearest gray seal colony.

Ono noted there is some information from a survey at Mount Desert Rock that was conducted from May through June. Sigourney noted that he was aware of this study and is considering including this information in a revised analysis.

Gray Seal Fishery Interactions (SCEMFIS/IAT - Doug DeMaster)
DeMaster presented results of a study done by the Independent Advisory Team (IAT) and funded by the Science Center for Marine Fisheries (SCEMFIS) titled "Evaluation of gray seal-fishery interactions in US waters of the western North Atlantic: Research actions needed to address management of marine mammal-fishery interaction in New England." The project objectives were to recommend to NMFS and the ASRG alternative protocols for implementing PBR-based management of a transboundary stock (e.g., gray seals in the western North Atlantic). One of the findings was that, based on a model fit to pup counts from Sable Island, Rmax should be increased from 0.12 (default for pinnipeds) to 0.141. This model indicates that the population at Sable Island is about 90% of the maximum. For PBR scenarios, they looked at different levels of abundance throughout the US and parts of Canada assuming different mixing scenarios, as well as different Rmax values, combined with bycatch in the US and Canada. Estimated bycatch in Canada was based on US bycatch rates (takes per metric ton of fish landed), because there is no bycatch data from Canada. They thought that if the fishing stayed relatively constant and the population went up, the PBR would also go up. If animals from Sable Island are included in the mixing scenarios, it seems to skew things; they were more comfortable with scenario 3, which was mixing only between US and SW Nova Scotia colonies. Incorporating these ideas into management could change PBR and potentially change the sink gillnet fishery from a Category I to a II, based on the bycatch to PBR ratio. Looking at rates

stratified by mesh size and target species would improve estimates of bycatch in Canadian waters, but they can't do that with available data, at least at the moment. More data on gray seal movement and exchange rates between US/Canada are also needed to refine the mixing scenarios. Incorporating the high 2019 bycatch would also change the model outcome and should be explored. They have finished their report on Rmax value, as well as the report on PBR, abundance and bycatch estimates. A research paper is in prep which uses simulations to evaluate the probability of making a false positive assessment (when you are over PBR when you aren't), versus a false negative assessment (when you are under PBR, but you are not). Error rates are minimized when the CV around Nmin is reduced relative to the CV around the bycatch, suggesting it is more economical to invest research dollars into Nmin. Results also showed that a 4 year survey interval is reasonable (versus 2 years).

Read remarked that the research changed the gillnet fishery categorization from a Category I to a II, yet many other species are caught in the gillnet fishery. DeMaster replied that fisheries are classified based on the species with the highest level of take in the fishery. Read asked why they wouldn't want to use the Sable Island numbers in the mixing model, when they based their Rmax recommendation on the Sable Island population. Doug said they didn't have enough satellite tagging data to give them enough certainty about mixing. He doesn't think the data are there to show panmixia between the US and Sable Island. It might be happening, but they don't see the data for it. Read added that before moving to scenario 4, you'd need more tagging effort. The choice between scenario 3 and 4 seems a bit arbitrary. Doug says more tagging data are needed to inform a better mixing model.

Murray asked if they looked at the level of mixing that would be necessary to avoid local extirpation, and what amount of tagging would give them the power to answer that question. DeMaster replied that it would be great to do that, but they did not.

Ono remarked that in DeMaster's presentation there were only ~100 animals caught in Canadian waters. DeMaster said that if US estimates of bycatch rates are used for Canada, it increases the amount caught there by about 100. There is not a lot of gillnet fishing effort in Canada so the total bycatch is estimated to be low. He doesn't know if there are major differences in catch rates between the two different countries. The more recent data for 2019 would change these numbers. The SRG suggested he might also consider incorporating the distance of fishing to the nearest pupping colony as a covariate, to take into account regional differences in seal abundance in Canada.

Moreno referenced the IAT report (shared with SRG) that shows how they calculated the abundances in different areas. At this point, their approach is a coarse approach to estimating bycatch in Canadian waters, because there are no data to estimate bycatch rates in Canadian waters. Is the gear similar enough or too different to be able to use US bycatch rates as a proxy for Canadian rates? Moreno suggests that someone explore this question. Moreno is happy to if they get the funding. Seasonal differences in bycatch rates that also consider mesh size or target species might make better estimates. This makes sense to explore since the bycatch of gray seals seems to have increased.

Moore commented that bycatch reported in the SAR is an "observed gray seal tossed off the boat" but the ones in Canada can also die because they are viewed as pests, culling, etc. The total amount of bycatch reported in the SAR is extrapolated from rates derived from events seen and documented by observers. Murray stated that seals that are in the net are almost always dead. Read agreed with Moore that animals that die as a result of fishing, but aren't observed dead by an observer need to be included somehow. He added that the MMPA does not allow for consideration of reproductive value, but the larger animals that suffer serious injury or mortality are more important to population growth than the juveniles. Murray mentioned that we need to make sure we aren't double counting dead animals year to year.

Merrick did not think that the fishing category would change. As described in the SAR, he also thinks this is one big population, which has repopulated US waters. Merrick asked if we should have two different stocks - Sable Island would be its own stock. The US stock and Canadian stocks need to be managed separately. Lawson says there are new gray seal breeding sites popping up around Atlantic Canada. Murray noted that the seals in Canada are contributing to high rates of increase in US waters, so the US and Canada seals are not demographically independent - this is backed by genetic evidence as well as observations of Sable Island branded females on Muskeget with pups. DeMaster said the hard part is estimating bycatch for Canadian waters when we don't know the numbers. Sable Island might have a totally different bycatch problem. Without observers near Sable Island, we won't know. DeMaster says we could move towards incorporating all seals into one population, if we get better numbers.

Read said there is also Scenario 5. There is enough gene flow to show they are all one group. We could look at the entire population, then get an idea of their movements. Then calculate PBR based on what proportion of the population is in US waters. We could simulate gray seal movement. Movement modeling would be best. Then, use that information to create a PBR. DeMaster said that would be interesting and they considered that in the paper, but there was not enough evidence to show complete panmixia. Merrick suggested using pup counts as an alternative. DeMaster replied that we are currently using these pup counts as the basis of our abundance estimates in US waters, and to do it that way would get us back to close to the same PBR.

Murray said she was happy to hear the SRG talking about some of the things she has been considering over the past few years. The U.S. abundance estimates in the SAR are based on pup counts, so they reflect abundance during the winter pupping season. It does not take into account seasonal changes in abundance as animals from Canada and the US move around to forage. We need to have a better idea of movements to understand seasonal changes in abundance, and to be able to inform a stock-wide PBR. Murray also wants to know how much tagging data are needed to inform a robust mixing model. We also need more data on older age classes, and for both males and females.

Moreno said that their bycatch estimates in the U.S. and Canada did not include live entangled animals (referred to in the discussion as "cryptic mortality") because they followed the current

approach used for SARS. Moore says that cryptic mortality is very different from serious injury (it was referred to as cryptic mortality because the number of animals that live with entanglements is an unquantified source of serious injury that eventually results in mortality). The SAR does include dead stranded animals with evidence of net entanglement, but does not capture the number of live animals living with entanglement because it is not systematically recorded, nor is there a way to identify unique animals that live for several years. Murray said we need to improve the current system for reporting and recording these animals.